REMARKS/ARUGMENTS

Upon entry of this amendment, claims 1 and 15 will be amended with claims 1-32 remaining pending, and claims 1 and 15 being independent claims.

Claims 1 and 15 have been amended in accordance with the originally filed disclosure so that an issue of new matter should not be considered to be present. For example, the Examiner's attention is directed to pages 5 through 7 of Applicants' originally filed specification, such as paragraphs [0028], [0029], [0031] and [0040], for introduction of air or oxygen.

The specification has been amended herein to explicitly include the terminology oxygen-containing gas in accordance with this implicit disclosure in the originally filed application.

Reconsideration and allowance of the application are respectfully requested.

Formal Matters

Applicants express appreciation for the acknowledgement of the claim of foreign priority and receipt of the certified copy in this national stage application.

The Office Action indicates that the drawings filed March 11, 2002 have been accepted. In this regard, Applicants note that the papers filed March 11, 2002 do not include drawings.

Rejections Based Upon Rotter, U.S. Patent No. 4,123,332

The following rejections are set forth in the Office Action:

Claims 1-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rotter, U.S. Patent No. 4,123,332.

The rejection contends that Rotter discloses a process and apparatus for carbonizing a comminuted solid carbonizable material wherein the comminuted material is passed through a horizontal reactor vessel. The rejection asserts that the conditions set for the passage of the material through a reaction zone by paddle-like impellers mounted on a shaft and the heating takes place in the reaction zone between 400°C to 900°C.

In response, Applicants respectfully submit that, as stated in the Summary of the Invention section of Rotter, Rotter is directed to a pyrolytic conversion process and apparatus wherein the material to be treated (in shredded, comminuted or particulate form) are continuously introduced into the inlet end of an elongated, cylindrical, and substantially horizontal pyrolysis reaction zone under conditions to effectively exclude oxygen containing gases. The material entering the reaction zone is continuously conveyed with agitation through the zone to its outlet end as a material's bed by a plurality of paddle-like impellers mounted on a rotatable able shaft extending through the zone. The bed of solid material is heated to a pyrolyzing temperature of from about 400°C to about 900°C by radiant and conductive heat transfer. The material comprising the moving bed within the reaction zone is thermally and progressively broken down into valuable products including gases, liquids and solid carbonaceous residues.

Rotter discloses at column 2, lines 15-24, that:

> The term "pyrolysis" as used in the art means the chemical decomposition of a material by the action of heat in the absence of oxygen. Since the pyrolysis is performed in an essentially oxygen-free atmosphere, the solid waste material, coal or wood residue does not burn. Hence, the solid feed material decomposes into products which include steam, gases, liquids, tars and solid residues including coke, char and non-carbonizable materials as may have been contained in the feed material.

Moreover, as will be discussed below, Rotter discloses throughout his patent structure and processes for avoiding the entrance of any oxygen-containing gases into the reaction zone.

Applicants note that Rotter, such as recited in claim 1 and column 8, lines 9-10, expressly requires that the waste products are present in the reactor chamber under conditions that rule out oxygen-containing gases. Oxygen-containing gas is not introduced into the reaction chamber at any later point either. The materials present in the reactor chamber of Rotter are heated indirectly through the combustion of gas or oil in a jacket around the reactor chamber. As noted in the above quote from Rotter, this is the classic principle of pyrolysis. Under these circumstances, the reaction in Rotter is a pyrolysis reaction, since no oxygen is present in the reaction chamber.

Any modifications made to Rotter must be made under the consideration that one skilled in the art would not design the reactor to have oxygen introduced therein since this would create an explosive mixture, which causes and has caused deflagrations and explosions, as is well known.

Independent claim 1 includes, amongst other recitations, supplying a controlled amount of an oxygen-containing gas to the container. Independent claim 15, includes amongst other recitations, an oxygen-containing gas supply to introduce a controlled supply of oxygen containing gas into the container

In contrast and as noted above, Rotter has to make sure that no oxygen enters the reaction chamber through his outlet openings. Therefore, Rotter conveys the gas-vapor mixture out of the reaction chamber under a slightly negative pressure (see column 7, lines 41 through 49 of Rotter). Rotter further discloses that the gases and vapor contained in the solid materials are also separated from the solid material in the solid-material discharge system by means of a negative pressure (see column 7, lines 49 through 55). After the process by Rotter has been concluded, there are thus in fact separate gaseous and solid reaction products which are also further processed separately.

Still further, Applicants respectfully submit that the rejection makes simple assertions that Rotter can be modified to arrive at Applicants' claimed invention. The rejection is contending that Rooter does not exclude Applicants' method and apparatus, and therefore Applicants' method and apparatus would have been obvious. However, this is not the test for obviousness. The test for obviousness is whether one having ordinary skill in the art would have been motivated to arrive at Applicants' claimed subject matter by modifying the prior art based upon motivation within the prior at. In the instant situation, the rejection is not providing any motivation in the prior art, such as

for controlling heating, but is merely alleging that it is obvious to control Rotter to arrive at Applicants' invention.

The naked assertions in the rejection are improper. Documentary evidence is required to support the rejection. Therefore, if the rejection is maintained, the Examiner is requested to support the statements of obviousness with motivation supplied in the prior art, and not merely making naked allegations.

Thus, Applicants respectfully once again submit that a method and device are disclosed in Rotter for pyrolysis of solid materials to form combustible gas, hydrocarbons and solid residues. To this end, the source materials are introduced into the reaction zone of a horizontally disposed container free of oxygen-containing gases. A material bed is formed with the material being agitated and thereby a combustible mixture of an oxygen-containing combustion gas and fuel is introduced into the reaction zone. Then, the combusted gases and solid residue are removed, whereby the gases not yet combusted and the hydrocarbons are removed under conditions effectively excluding oxygen-containing gases.

In contrast to Rotter, in Applicants' invention the waste products are not pyrolyzed, but thermally decomposed. This thermal decomposition is a controlled process between pyrolysis and combustion. This makes it possible not to have to conduct the process under absolutely gas-tight conditions. In addition to the solid decomposition products, a crude gas is also produced with thermal decomposition. In contrast to Rotter, these two products are jointly extracted as an exhaust gas-solids mixture from the container through the discharge opening and fed through ducts to a

device for cracking the long-chain hydrocarbons and/or to a device for the gasification of the solids. In this way the exhaust gases and solids from the container are processed for energy recovery.

In Rotter, structure is not provided for the joint discharge of an exhaust gas/solids mixture. Instead, distinctly separate outlet openings are present in the device components 47 and 26 in Fig. 1 (see also claim 17 (f) and (g)). Applicants note that entrained gases can be removed at 49 in Rotter from the solids; however, this removal does not comprise a discharge opening for exhaust gas-solids mixture. At most, Rotter discloses structure for separately removing gases and solids, with entrained gases being removed from the solids at 49.

Applicants' device is constructed and arranged so that pyrolysis of the source materials is not carried out. Instead, there is a controlled thermal decomposition between pyrolysis and combustion. To this end different criteria needs to be considered which Rotter did not need consider, since he wants only to pyrolyze his source materials.

For example, Rotter does not teach or suggest at least one of a device for cracking hydrocarbons and a device for gasification of solids from the container positioned after the discharge opening of the container as recited in Applicants' independent claim 15.

Applicants also remind the Examiner that in Rotter the burners are located at the rear of the reaction vessel. In particular, as disclosed beginning at column 6, line 22, Rotter discloses the placing a starter burner 36 at the rear of the container, and in

operational pyrolysis mode, locating a plurality of burners 38, 39 and 40 at the rear of the reaction vessel. Thus, in contrast to Applicants' recited 60 - 80% of energy input being carried out on the material in an area of a first quarter of the container based upon the one end of the container into which the material is fed, and a remaining 20 - 40% of energy input being transferred to the material in other areas of the container, Rotter places a higher energy input at the rear. Certainly, a higher energy input at the rear of a reaction vessel does not teach or suggest Applicants' method where the lowest energy input occurs.

Moreover, the three burners 38, 39 and 40 of Rotter (all located in the vicinity of the material outlet end of the system) are positioned to apply energy in an annular, spiraling arrangement. Thus no differentiation of the amount of energy regarding its input point along the length of the reaction vessel is made in Rotter.

Thus, when the prior art discloses in pyrolysis installations to apply energy uniformly or clearly and exclusively in the rear part of the container, there is no motivation to one having ordinary skill in the art to arrive at Applicants' method as recited in Applicants' claims. If according to the Examiner's statement it is desirable according to Rotter to heat the material quickly, Rotter has found and shown the solution for this by utilizing the burner formation at the rear of the reaction vessel in the vicinity of the material outlet.

Still further, as noted above, Rotter does not teach or suggest discharging an entire exhaust gas-solids mixture from the container, and subsequently subjecting the exhaust gases and the solids to an energy recovery process. In Rotter, gases and

vapors are guided through a recovery system in which the condensible vapors and non-condensible gases are separated from one another. Subsequently only the combustible gases are guided back into the system as a fuel source for the pyrolysis burners (see column 7, line 55 through column 8, line 2). No information is given on whether and what should or can be done with the liquid hydrocarbons.

Accordingly, Applicants once again point out that the assertions in the incorporated rejection that on the basis of Rotter one skilled in the art would be capable of providing recovery means which would include specifics like a gasifier or cracking apparatus in order to further treat the gases from the pyrolysis of waste thus rendering Applicants' invention as a whole obvious absent criticality in showing is without appropriate basis. If this ground of rejection is maintained, the Examiner is respectfully requested to specifically point to disclosure in the prior art which shows the inclusion of such process steps to be known in environments as disclosed by Rotter, and to specifically indicate how the combination is being made. In this regard, the Examiner is reminded that a showing of criticality is not needed unless a prima facie case of obviousness has been established. In the instant situation, a prima facie case of obvious has not been established, especially when the rejection does not point to any documentary evidence to support the assertions therein.

Thus, Applicants respectfully submit that the only teaching or suggestion that would lead one having ordinary skill in the art to arrive at Applicants' invention is within Applicants' disclosure, and the use of such disclosure by the Examiner is improper. In order to support the conclusion that the claimed invention is either anticipated or rendered obvious over the

prior art, the prior art must either expressly or inherently teach the claimed invention or the Examiner must present a convincing line of reasoning why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. Ex parte Clapp, 227 U.S.P.Q. 972 (B.O.A. 1985).

Additionally, each of the dependent claims is patentable over the prior art of record in view of the fact that each of these dependent claims includes the limitations of either independent claim 1 or 15. Moreover, each of the dependent claims is patentable over the prior art of record because it would not have been obvious to one having ordinary skill in the art to incorporate such dependent claim features into the invention as more broadly recited in the independent claims.

For the reasons set forth above, the anticipation and obviousness rejections should be withdrawn, and each of the claims indicted to be allowable over the prior art of record.

CONCLUSION

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections of record, and allow each of the pending claims.

Applicants therefore respectfully request that an early indication of allowance of the application be indicated by the mailing of the Notices of Allowance and Allowability.

Should the Examiner have any questions regarding this application, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,
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